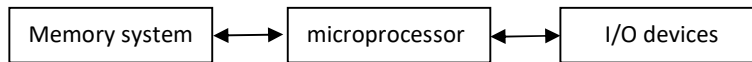Q-1

1) List the components of a computer , also draw a block diagram of personal computer?
    -microprocessor   , memory system ,and I/O devices

2) Define bit, byte, word, double word, quad word and instruction?
   Bit : 0 or 1 , false or true
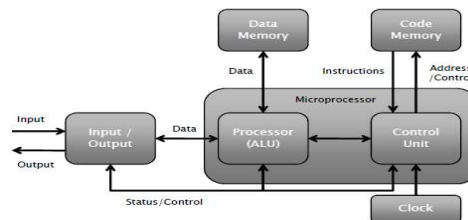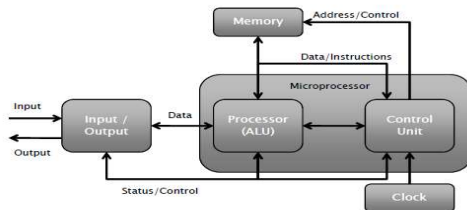   Byte : is an 8 bit
   Word : is a 2 byte
   Double word : is 4 byte
   Quad word : is 4 words

15

3) What determines that Microprocessor is an 8, 16 or 32 bit?
   is the size of the data path

4) List two types of computer architecture with a block diagram for each?
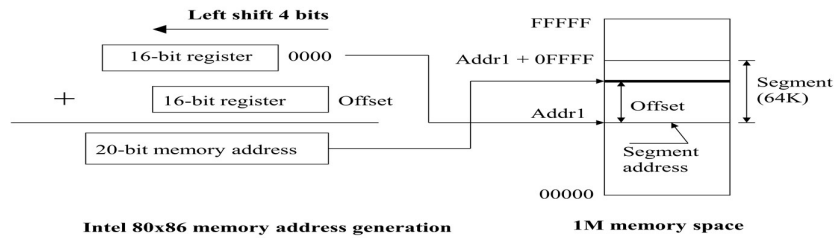   Von Neumann architecture   and   Harvard architecture

5) Draw and explain the architecture of 8086?

   8086 has been divided into two functional units Bus Interface Unit (BIU) and
   Execution Unit (EU) ,The BIU has to interact with memory and input and
   output devices in fetching the instructions and data required by the EU.
   EU is responsible for executing the instructions of the programs and to carry
   out the required processing.
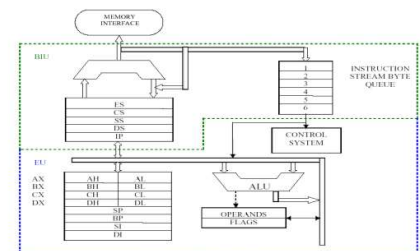
6) What are important signals (pins) of Intel 8086?
   ALE ,DEN, AD0-AD15, DT/R', M/IO' , RD',WR' , MN/MX' ,BHE' ,INTR ,INTA , NMI

7) What is the function of a segment register in 8086?
   Each segment contains the stating address of the corresponding memory segment block.

8) Explain the concept of segmented memory?
   Segmentation means that the primary memory divided into a number of blocks , where each block are 64kbyte,
   each block has different purpose , such code segment block contain only codes , data segment contain the data of
   the programs ,......

9) Explain the concept of pipelining in 8086. Discuss its advantages and disadvantages?
   A technique used in advanced microprocessors where the microprocessor begins executing a second instruction
   before the first has been completed. That is, several instructions are in the *pipeline* simultaneously, each at a
   different processing stage.

10) How does 8086 convert a logical address to physical address? Explain using diagram?
    Multiply the segment address by 10 then add it to the offset address.

Left shift 4 bits
16-bit register | 0000
+
16-bit register | Offset
20-bit memory address

FFFFF
Addr1 + 0FFFF
Segment (64K)
Addr1 | Offset
Segment address
00000

Intel 80x86 memory address generation 1M memory space

11) Explain the difference between NEAR and FAR procedure of 8086 processor?
   Near procedure means that a 16bit displacement will be added to the IP .
   FAR procedure means that a 4 byte will placed into IP and CS.

12) What is the difference between CALL and JMP instruction of 8086 microprocessor?
   CALL : the microprocessor before it jumps to a sub procedure **will save the return address** in the stack.
   JMP : the microprocessor jumps to a other location, and it will not return back to the original place i.e does not save the return address.

13) Differentiate between software and hardware interrupts?
   Hardware interrupt were the interrupt initiated by other devices through INTR pin or NMI pin .
   Software interrupt were the interrupt initiated by an instruction such as INT XX where it does not need to use any pin.

14) What does the CPU do when it receive an interrupt? How do you enable and disable interrupts in 8086?
   -Once microprocessor receive a interrupt signal INTR , microprocessor will check the interrupt flag if its enabled or not , then microprocessor sends back an INTA to get the interrupt vector number.
   - using interrupt flag 'IF' can enable/disable the interrupt

15) How many interrupts are available in 8086?
   There are 256 type of interrupt
   ===

Q-2) A. What physical address is represented by:
   (i)   4370 : 561E H   ===   48D1EH
   (ii)   (ii) 7A32 : 0028 H   ===   7A348H
   B. Describe the difference between the instructions:
   (i)   MOV AL, 0DB H (ii) MOV AL,DB H

   both instruction will produce the same result , only at some assembler if we use second instruction you will
   get an error .

 C . Given that the stack segment register is pointing to location 1105h, the stack pointer register contains 001Ah, AX = 2456h, BX = 4562h, **indicate the address of the bottom of the stack**, and **the address of the top of the stack**. If the instruction PUSH AX followed by instruction PUSH BX are performed, **calculate the new value of SP** and **indicate how the values of AX and BX are stored in memory?**

The bottom of the stack == SS = 1105H
the address of the top of the stack == SP = 001A

The new SP = SP$_{old}$ − 2 (for each push) = SP$_{old}$ -4 = 0016h

XX	XX	XX
XX	XX	XX
	24	24
	56	56
		45
		62
	PUSH AX	PUSH BX

==
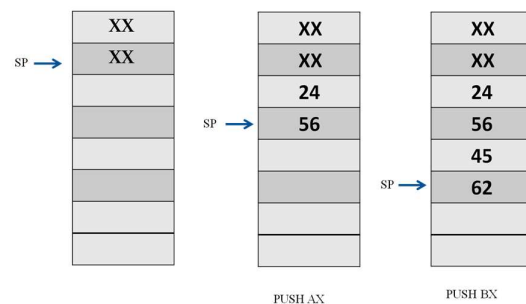
Q-3 A. State the differences between I/O mapped I/O and Memory mapped I/O ?

Isolated I/O (I/O mapped I/O) uses the IN, OUT, INS and OUTS instructions to transfer data to/from I/O device, I/O address space does not take space from the memory.
Memory mapped I/O transfer data to I/O device simply by using any instruction that references the memory. I/O address space does take space from the memory system.

B. Draw the block diagram of 8255 and explain its working. What is Control Word?

Figure 1.3
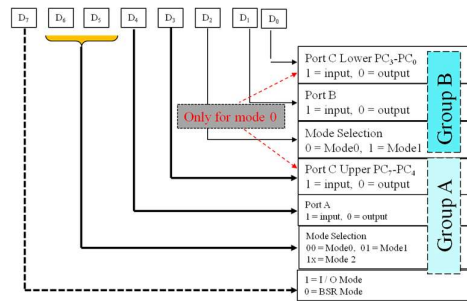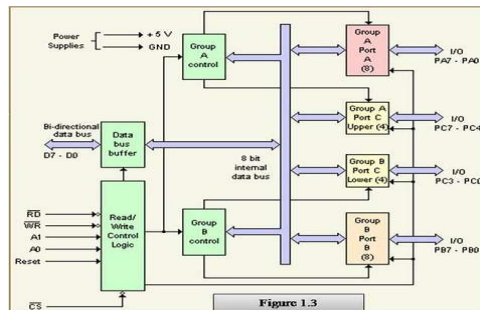
C. Determine the control word for the following configuration of 8255:-
Port A – Output   ,   Mode of port A – Mode 1   , Port B – Output , Mode of port B – Mode 0 ,Port C lower (pins PC0 – PC3) – Output.
CWR = 1010X000 == A0h

D. Determine the control word for the following configuration of 8255 for mode 2operations. Group A – bidirectional mode   , group B – output - mode 1.
CWR = 11XXX10X == C4h

==

Q-4 A. Write a ALP to clear the screen, and set the cursor at the center of the screen.
......
```
MOV AX,0600H   ;scroll entire screen
MOV BH,07        ;normal attribute
MOV CX,0000     ;start at 00,00
MOV DX,184FH   ;end at 24,79 (hex=18,4F)
INT 10H            ;invoke the interrupt
```
……..
```
;setting the cursor to the center of the screen
MOV AH,02        ;set cursor option
MOV BH,00        ;page 0 BH=0 unless you intend to use multiple display pages.
MOV DH,12        ;center row position
MOV DL,39        ;center column position
INT 10H           ;invoke interrupt 10H
```

B. Write an ALP to read a string from keyboard then display it on the screen (5 lines below the current cursor position ?

```
        .model small
        . Data
        str   DB  4 , ?  DUP  FF
        .code
         …………………..
         …………………..
        MOV  AH , 0AH
        MOV  DX , OFFSET str
        INT 21H
           mov ah,3    ;get cursor position
           int 10h        ;DH=row, DL=column
                 add DH, 5
                       mov ah,2
                       INT 10h
            mov  ah,09H
            mov  dx,OFFSET string
            int  21h
           ret
           .exit
           end
```
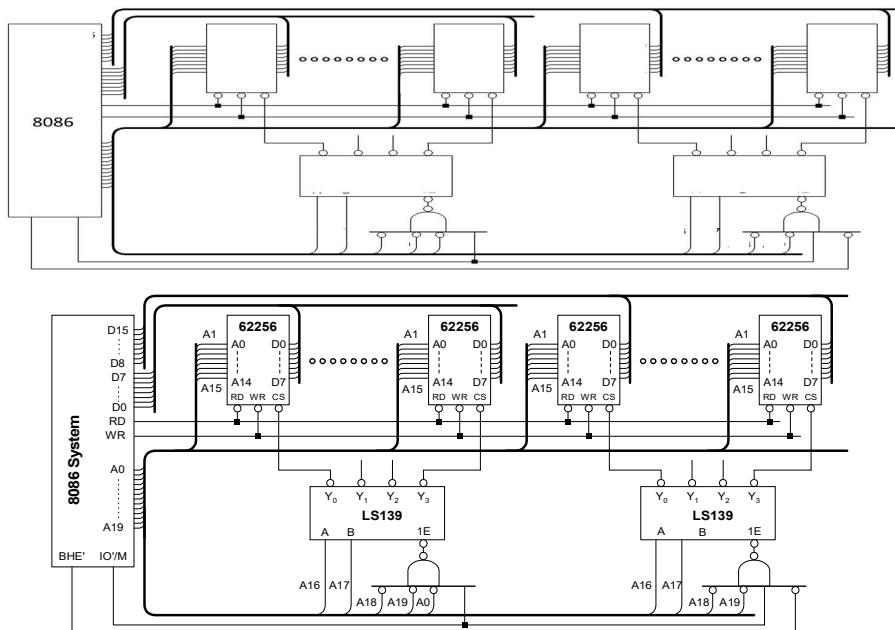
C. using the following figure:
   1- how many memory chip used ? what is the size of each memory chip?
   2- Show the Lable of all lines?
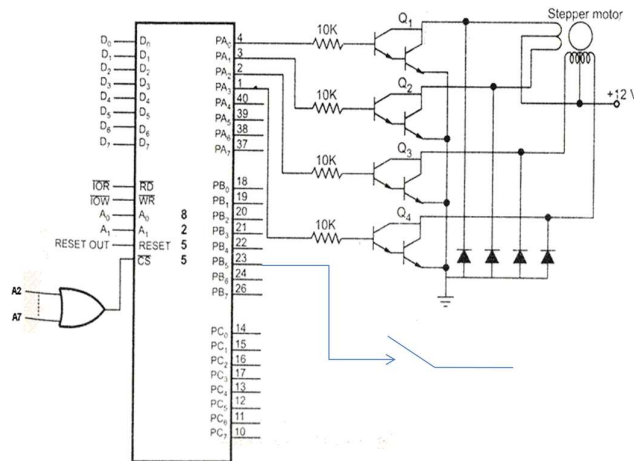   3- Show the memory map table (the starting/ending address for each pair of memory chip)?

Q-5   A.Write a subroutine that will count the number of WORDS in a string. A word is any set of ASCII characters separated by ONE OR MORE 'space' characters (a space character has the ASCII value of 20h). You can assume the strings only have letters or spaces in them. The string is terminated by a zero byte (00h) and the starting address of the string is passed in BX. Return the number of words in the string in register 'AX' (you can assume there is less than 65535 words in the string). Example: " A lazy person you are" has 5 words.The first letter of the string can be a space or the end of the string.

B. 1- Configure the ports of 8255 (PPI) as follows: port A=input, port B=output, port , CU=output, port CL=input,Assume that the 8255 PPI is located at 300H ?

   2 - Given the 8255 connection to the stepper motor of Figure below, write a down the required code in an assembly language to rotate it continuously.

   3 - the stepper motor rotate in both direction based on a state of switch (A)

   4 - press any key on the keyboard to stop it.

     Note: stepper speed is 1 cycle per minute .

==========================Gooood luck ==========================